AN
ENQUIRY
Into the
EXILITY of the VESSELS
In a
Human Body, &c.

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AN ENQUIRY Into the EXILITY of the VESSELS In a Human Body:

WHEREIN

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ANIMAL IDENTITY is Explained, and ſhewn Incommunicable to any Individual throughout the whole Species.

K.

By *CLIFTON WINTRINGHAM*, Jun.
Fellow of the *Royal Society*.

Profecto veriſimile eſt, & Hippocratem & Eraſiſtratum & quicunque alii, non contenti Febres & Ulcera agitare, verum quoque Naturam aliqua ex parte ſcrutati ſunt, non ideo quidem Medicos fuiſſe, verum ideo quoque majores Medicos extitiſſe.

CELSUS in Præfat.

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MDCCXLIII.

29

MVSEVM
BRITAN
NICVM

TO

Edward Wilmot, M.D.

Phyſician in Ordinary to His
Moſt Sacred MAJESTY the
KING of *Great Britain*, and
to his Royal Highneſs the
Prince of *Wales*; Fellow of
the College of Phyſicians in
London, and of the *Royal
Society*.

4 N 6

SIR,

THE following Enquiry containing ſeveral Particulars, which, tho' they have not been hitherto either regarded, or perhaps underſtood by vulgar Anatomiſts, may not on thoſe Accounts at all the leſs tend to illuſtrate the ſurprizing Structure of Animal Bodies, requires the Protection of One, whoſe known Abilities in every Branch of Phyſick, may ſilence the Cavils of thoſe, whoſe Penetration ends with the Edge of their Knife, or the Flowing of an Injection. This Conſideration alone, had I no other, is a ſufficient Warrant for my Application to you. But if the ſpontaneous conferring of Favours on ſuch, as had no Claim to them, but the mere Benevolence of the Donor, demands a publick Acknowledgment; I ſhould be wholly unpardonable, did I not take this Opportunity of returning you my Thanks for thoſe ſingular Lights you was pleaſed to afford me during my Attendance at St. *Thomas*'s Hoſpital, where I had not only my own Doubts reſolved, but new Steps pointed out, by that uncommon Sagacity, which has raiſed you to the higheſt Pitch of the Profeſſion, and rendered you ſo juſtly eſteemed by all, who have the Honour of your Acquaintance. As theſe, Sir, were the Motives of this my Application to you, I thought myſelf excuſable in not acquainting you with it, leſt you ſhould prevent me from thus acknowledging the Obligations I lie under, as well as declaring how much I am,

Sir,

Your moſt obliged

humble Servant,

Feb. 3. 1742.
Bennet-Street,
St. James's.

C. Wintringham.

AN ENQUIRY Into the EXILITY of the VESSELS In a Human Body, &c.

THE Structure of the Animal Body, whether we conſider the Size, Situation and Uſes of its larger and more complex Parts, with relation to each other, and their Subſervience to the whole, or by diving deeper into the ſecret and more myſterious Parts of Nature, we ſcrutinize the ſeveral Parts of which theſe are compoſed, exhibits to our View ſuch an amazing Scene of unbounded Power and Wiſdom, as infinitely exceeds all the Contrivance of the reſt of the viſible Creation, how great the Bodies, or aſtoniſhing ſoever their Motions and Revolutions may upon a ſtrict Enquiry appear to us.

Ου' θ' 'Εσπερος ου' θ' 'Εωος ου'τω θαυμαστὸς *(a)*.

But tho' this Poſition is ſufficiently evident from the Structure of every Organ in the Animal Body, yet it is in no Part ſo ſingularly aſtoniſhing, as in the Growth of Animals, from their firſt original Stamina in the Animalcule,

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(a) Ariſt. Ethic. lib. 5. cap. 1.

malcule, till they arrive at their appointed Size.

That every Veſſel and Fibre in the Body is contained in Miniature in an Animalcule, few, I believe, will diſpute, it being abſolutely impoſſible, that mere Matter and Motion, without its being conducted by the Veſſels proper to an Animal, ſhould produce an Animal at all; and ſtill more abſurd, if there can be Degrees in Abſurdity, to ſuppoſe ſuch a Cauſe capable of producing that Variety of Species, in their regular Order, which, we ſee, is conſtantly kept up thro' ſo great a Series of Years and Generations; but that inſtead of a Calf, a Cow might as naturally produce a Lion, Camel, or any other Creature, as frequently as its own proper Species.

Beſides, could the Parts or Limbs, or even the moſt minute Organ be produced by the Motion of the Fluids, without their being conducted by the Veſſels of the Organ itſelf already latent in the Stamina, what ſhould hinder, why any Part taken away by Amputation ſhould not again be perfectly formed and reſtored, ſince all the adductory Veſſels continue in their former State, and are capable of ſupplying the ſame Fluids as before? Conſequently ſince the moſt minute Organ cannot be ſupplied by any other than the forementioned Method, can any thing be ſo abſurd, as to ſuppoſe that all the regular Order of Veſſels neceſſary to compoſe the whole Bodily Machine ſhould be produced by ſuch a Cauſe, as is utterly incapable of forming the leaſt Part imaginable in a regular Manner? This is no leſs exemplified in the Seeds or proper Embryos of Plants. Thus the Seed of the Fir-tree, whoſe Bulk with all its Integuments ſcarce equals the Head of the ſmalleſt Pin, has its Fibres and Veſſels ſo enlarged by the Addition of freſh Particles, as to grow to an enormous Size, without ever deviating (in whatever Soil it grows) from its own Species into any other kind of Tree. Which can be owing to no other Cauſe than the original Stamina latent in its Seed; which not only ſeparate, but conduct the Particles proper for its Nouriſhment, each to its proper Place in a manner peculiar to itſelf, thereby diſtinguiſhing it from all other Vegetables of what kind ſoever. But a Branch once lopped off can no more be reſtored by the Gardener's Art, than an amputated Limb by the Surgeon's: 'Tis true, indeed, new Buds may be thruſt forth by the redundant Nouriſhment, both in the adjacent and more remote Parts, to compenſate in ſome meaſure this Defect: but whether this Mutilation of the Plant be of its Summit, or of a lateral Branch, the Extremity muſt ſhrivel and dry up, and will bud and bloſſom no more.

If therefore mere Matter, altho' ſuppoſed to be in Motion, muſt be thus conducted by the Veſſels of an

Animal, it muſt be conducted by the Animal itſelf, no Application of different Forces *ab extra* to the Veſſels (was there any ſuch thing, as it is evident from the Structure of the Uterus, there is not) being capable of regulating and directing ſuch an innumerable Variety of Motions, or indeed of contributing to its Operations, any farther than ſupplying it with a proper Nidus, and furniſhing it with Materials ready prepared for the Purpoſe, as ſufficiently appears, not only from the Obſervations of the accurate Malpighi, Bellini, Redi, Merian and others, but diſcovers itſelf to our Senſes, in the Generation of innumerable other Species of Animals, ſome depoſiting their Eggs on Vegetables, or in the Earth, to be brought to Light by the genial Warmth of the Sun, others in Dunghills, and other putrefying Subſtances, and others in Streams of Water, where it is impoſſible for any ſuch Force to be applied.

Hence then Nutrition muſt conſiſt not only in the mere Diſtenſion, but in the Appoſition of new Particles into ſuch Parts of the Animal Body, as by the Enlargement of the Pores, and Vacuities in the Solids, are fitted to receive them, as I have elſewhere ſhewn by Experiment (*a*) : And, indeed, was it otherwiſe, the Animal would have a Power of making its own Fibres and Veſſels, and conſequently of producing itſelf; nay the

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(*a*) See Sect. 7. Exp. 11. of an Experimental Enquiry on ſome Parts of the Animal Structure.

Circulation of the Fluids muſt be performed in Veſſels, before the Veſſels themſelves, thro' which it is to be conveyed, have a Being; which are ſuch Abſurdities, as I ſhall not give myſelf the Trouble of confuting.

That theſe new Particles by adhering firmly to the original Stamina increaſe the Bulk of the Animal, till ſuch time as it arrives at the Perfection its Structure is capable of, needs no Proof; but that the Strength of the original Animal owes its gradual Improvement to the ſame Cauſe, is likewiſe evident from the common Practice of ſeveral of our mechanic Workmen, who by ſteeping and ſaturating porous Woods, or the like light and brittle Subſtances in glutinous

Decoctions, vaſtly increaſe their natural Strength, without any Addition to their external Bulk, which would be ſtill farther increaſed, was that alſo enlarged by a regular Diſtenſion of Parts, as in the Caſe of Animal Bodies.

Hence then it will follow, that theſe adventitious Particles, which by their Coheſion with the original Stamina, increaſe the Bulk and Strength of the Body, and thereby enable it to perform the proper Offices, for which it was created, are not really any Part of the Body itſelf, but extraneous to it, actuated and regulated intirely by it, and conſequently contribute no farther to its exerciſing the Powers, it is deſigned to exert when perfect, than would be performed by a ſtrong

Lever acting with ſuch a Power, as would be impoſſible for a weak one to ſuſtain, tho' in all other Reſpects the Caſe might be exactly parallel.

Nor is this leſs true with regard to the Senſations, than Strength of the Body. A proper Tenſion in the nervous Fibres being as requiſite in this Caſe, as Strength in thoſe deſigned for Muſcular Motion, as appears from the pernicious Effects of too great Laxity, as well as Rigidity, in ſeveral Diſeaſes, the one rendering the Senſations ſo languid and ſlow thro' their weak Vibrations, as not to affect the Animal with ſufficient Force and Vivacity; whilſt the other, thro' too great Stiffneſs and Inflexibility, ſcarce allows them to vibrate at all, as is the

Caſe in old Age; or laſtly by being too ſpringy and elaſtic, and thence exciting too ſtrong and frequent Vibrations in ſuch as are younger, either renders their Senſations painful and uneaſy, or ſo quick in their Succeſſions to each other, as to prove uſeleſs, nay often prejudicial to the Animal, as is the Caſe in Phrenſies, Maniacal Perſons, and the like.

How far the Strength of the Body depends upon the adventitious Particles derived to it by Nutrition has been explained above, and it is hence no leſs evident, that they cannot poſſibly contribute farther to its Senſations, than as they add ſuch a Degree of Firmneſs, as may prevent any external Species from acting upon the nervous Fibrils ſo forcibly, as to injure them; whilſt at the ſame time by their intimate Adheſion with the original ſenſitive Organs, they cannot act upon the one, without exciting a proper Degree of Motion in the other; and conſequently the real Senſitive Part of an Animal can contain no greater Quantity of Matter, than is included in the Nervous Parts of the Animalcule.

This then being the State of an Animal when arrived at its Perfection, how amazing muſt it be to conſider, how ſmall and weak Organs do really actuate the whole Machine! But that this may more fully appear, and alſo afford us ſome determinate Idea of their extream Tenuity, I ſhall endeavour to reduce ſuch Microſcopical Obſervations as are of beſt Credit to a certain Standard; that by comparing them with each other, and reducing them to Numbers, our Notions of them may not be altogether ſo vague and indeterminate as at preſent they are.

Leeuwenhoek, that curious and diligent Inquirer into thoſe Works of Nature, which till his Time had by their Minuteneſs eſcaped all Diſcovery, has by his repeated Microſcopical Obſervations on the *Semen Maſculinum* of Animals, not only ſhewn, that it abounds with Animalcula proper to each Species, but that, according to his Judgment, a thouſand of them would ſcarce be equal in Thickneſs to a Grain of Sand (*a*); and conſequently that a cubical Inch would contain a thouſand Millions of Millions of theſe little Beings. Profeſſor *Keil* indeed, in his elegant Inquiry into the actual Diviſibility of the Particles of Matter, has from a Principle of Dioptrics computed their Magnitude to be ſomewhat greater than that juſt now mentioned; but he has however demonſtrably ſhewn, that the Length of a ſingle Animalculum cannot poſſibly exceed the $\frac{3}{100000}$th Part of an Inch (*b*). That our preſent Enquiry may therefore be wholly confined within the Limits of Truth, rather than proceed upon probable Conjecture,

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(*a*) *Leeuwenhoek* Epiſt. 41. Tom. IV.

(*b*) *Introductio ad veram Phyſicam*, p. 48.

ture, we will make Choice of this latter Eſtimate, and for the further Conveniency of Calculation, take it for granted, that when the Foot is decimally divided, even ſuch a Cubical Inch will exceed the Bulk of a ſingle Animalculum, in no greater a Proportion, than that of a thouſand Millions of Millions to 27.

Now the ſpecific Weight of the various Parts of an Animal Body reduced to a Medium amounts to a little more than the Weight of an equal Bulk of Water; if therefore we ſuppoſe one of theſe Animalcula to be to Water, as the other Parts of young Animals are, (and greater it cannot be, as appears from what I have elſewhere demonſtrated with relation to the increaſed ſpecific Gravity in the Arteries of aged Animals (*a*), it follows, that as a Cubical Inch of Water is equivalent to 0.5271 parts of an Ounce Troy, the Weight of a ſingle Animalcule will be equal to the $\frac{1}{140391450739}^{\text{th}}$ part of a Grain nearly.

But by the Experiments of the ingenious Dr. *Keil* it appears, that in a Man of 12 Stone-weight, the Fluids are to the Solids when taken at a Medium, at the leaſt in the Proportion of 8 to 3 (*b*), excluſive of thoſe, which by the Help of Fire and a Chymical Proceſs may be extracted without the Deſtruction of a ſingle Fibre, which amounts to no ſmall Quantity. It has

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(*a*) Sect. 5. Exp. 11. of an Experimental Enquiry on ſome Parts of the Animal Structure.

(*b*) *Eſſays on ſeveral Parts of the Animal OEconomy*, p. 38. *to* 63.

alſo been farther ſhewn by Experiment, that the Veſſels in young Animals bear a much leſs Proportion to their Cavities, than the like Veſſels in old ones of the ſame Species bear to theirs (*a*); conſequently, ſince the Denſity of any Body is as the Weight of the Body directly, and its Magnitude inverſely, we ſhall find, by comparing the foregoing Proportions of the Fluids and Solids together in each different State of the Animal, as well before its Birth, as after it has arrived at full Maturity, that all the Stamina, from which ſo noble a Being as Man himſelf was at firſt derived, could not contain ſo much ſolid Matter as would be equal in Bulk, to that of a Quantity of Water, of no greater a Weight

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(*a*) Sect. 3. Exp. 11 *of the Experimental Enquiry, &c.*

than the $\frac{1}{92408129934910602442073752000}$th, part of a Grain.

If the preceding Exility of the Solids in general be ſo ſurpizingly ſmall, That of the Senſitive Parts alone, could their Relation to the reſt be once adjuſted, would doubtleſs, to ſpeak in the Language of the Mathematicians, appear a mere Infiniteſimal. For even *Leeuwenhoek* has declared in expreſs Words, that "*Hæ Cerebri* "*Fibrillæ, tenuibus puto amiciuntur* "*Membranulis, quæ ob inſignem* "*Exilitatem nunquam ſeſe nudabunt* "*conſpectui noſtro: Quod niſi* "*ſtatuamus, quo pacto Fibrillarum* "*Diſparationem vel Diſtinctionem* "*Oculis aſſequeremur?* (*a*)" To

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(*a*) *Leeuwenhoek* Epiſt. 34. Tom. IV.

which he might have added our Intellectual Faculties alſo, it being ſcarce poſſible to conceive Fibres always growing and encreaſing in Bulk, ſhould be kept ſeparate, and perform their various Operations, but muſt ſoon prove immoveable, without being divided from each other by theſe ſlender Partitions.

This is not only evident from the Nature of the Fibres, but demonſtrable from Fact in the larger Parts even of full-grown Animals; which, when contiguous and deprived of their proper Integuments, never fail to adhere and unite firmly to each other, as is ſufficiently known to the Practitioners in Surgery. How much ſooner then would this Adhæſion be produced in growing Animals, where the Fibres are not only more ſupple, and thence more eaſily united, but if deprived of theſe Membranes, would daily as they increaſe in Bulk, preſs more ſtrongly againſt each other?

The Writers in Geometry have laid it down as an eſtabliſhed Maxim, that *ubicunque deficit Modulus, in æternum latebit Menſura*; on which account, tho' we may reſt ſatisfied, that the Subtility of the ſenſitive Parts in an Animal Body muſt neceſſarily ſo far ſurpaſs the Extent of human Abilities, as to put their Bulk beyond a Poſſibility of being ever determined to a Mathematical Exactneſs; yet even the Nerves themſelves, thoſe delicate Inſtruments of all our

Knowledge, may be brought under ſuch an Examination, as to afford us a much clearer Idea of their exquiſite Minuteneſs, than what can be obtained from thoſe conjectural Deſcriptions, the Anatomiſts have hitherto given us concerning it.

For it is evident, that all the Membranes of an Animal Body have Muſcular Fibres, and that even the greateſt Number of them are principally made up of ſuch; conſequently we could not err very far from the Truth, were we to eſtimate the Bulk of the Membranous Fibres in the ſame Proportion with the Muſcular ones. But we ſhall examine the Bulk and Proportion they bear to each other a little more diſtinctly.

Now *Leeuwenhoek* in his Obſervations on the Muſcular Fibres has ſhewn, that ſome of them were equal to the $\frac{1}{9}$th, others to the $\frac{1}{16}$th part of a Hair (*a*); conſequently ſuppoſing each Fibre to be the Length of a Decimal Inch, there will be contained in ſuch a Cubic Inch ſeven Millions two hundred ninety thouſand of the former, and twenty-three Millions forty thouſand of the latter Kind. But theſe Muſcular Fibres are by later Obſervations found to be really ſmall Muſcles, conſiſting of Parts ſimilar to the large one, which they conſtitute, and terminating in Tendons after the ſame Manner as the former; and conſequently the Fibres, of which

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(*a*) *Leeuwenhoek*, Epiſt. 6. Tom. IV.

the more lax and cavernous Parts of the Muſcle are compoſed, muſt be much ſmaller than the muſcular Fibres rendered viſible by his Glaſſes. Whether theſe be the ſame individual Fibres, which conſtitute the Tendon, by being more cloſely compacted in their Parts, I ſhall not undertake to determine; but this we learn from the forecited Author, that a hundred of theſe exceed not the Bulk of a Hair (*a*), and conſequently nine hundred Millions of them will be contained in the forementioned Cubic Inch.

But theſe are far from being the ſmalleſt Fibres in the Body. For that the pellucid Membranes conſiſt

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(*a*) *Leeuwenhoek* Epiſt. 14. Tom. IV.

of Fibres of ſtill ſmaller Dimenſions, decreaſing probably to the $\frac{1}{300}^{\text{th}}$ part of a Hair, or upwards, is evident from the Structure of thoſe fine Capillary Arteries, which are deſtined to convey a Fluid to them. For the whole Diameter of ſuch an extream Artery does not exceed the $\frac{1}{1620}^{\text{th}}$ part of an Inch (*a*), that is, the $\frac{1}{5}$th of a Hair nearly, and yet the Coat of this Veſſel is made up of at leaſt three diſtinct Species of Membranes, each of them furniſhed with Veſſels peculiar to itſelf. And farther, if we conſider, that the tranſverſe Section of every Veſſel is of a circular Form, we muſt neceſſarily allow, that the Longitudinal Fibres muſt be much ſmaller than any of thoſe abovementioned; other-

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(*a*) *Hale's Hæmaſt.* Exp. 9.

wiſe inſtead of a Circle, a Polygon would be produced, as is evident from Geometry.

Now even theſe are bulky Subſtances, when compared with the nervous Fibrils deſtined to Senſation, as appears from thoſe which form the Retina. For theſe Fibres were manifeſtly before their Expanſion into this Membrane collected within the Bulk of what is ſtyled by Anatomiſts the Optic Nerve, and are, as the ingenious Profeſſor *Monro* aſſures us, ſo extreamly ſmall, that it is demonſtrable, they cannot exceed the Thickneſs of the $\frac{1}{32400}$th part of a Hair (*a*). If therefore we reject the odd four hundred in the foregoing Fraction,

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(*a*) *Monro*'s Anatomy of the Human Bones and Nerves, p. 3.

and ſuppoſe, that no more than 32000 of theſe Nervous Fibrils are neceſſary to make up a Thickneſs equal to that abovementioned, and alſo ſet the Muſcular, Tendinous, and Membranous Fibres to be at a Medium, of no greater a Thickneſs than the $\frac{1}{200}$th Part of a Hair, (which, from what has been juſt now explained above, is apparently a very large Allowance with reſpect to the Subtility of the Fibres in general) it will then follow, that the Thickneſs of one of theſe Fibrils in the Retina will be to that of ſuch Fibres, as conſtitute the other Membranes and Organs of the Body, in the proportion of 1 to 160. But we have already ſhewn, that all the Stamina in an Animalcule could not contain ſo much ſolid Matter, as is equal in Bulk to a Particle of Water weighing the $\frac{1}{92408129934910602442073752000}$th part of a Grain; conſequently, if we ſuppoſe, that a Nervous Fibril does accompany every individual Fibre in the Animal Syſtem, and compare the Proportions they bear to each other as given above, we ſhall find, that the whole ſenſitive Parts in the Animalcule taken together could not amount to a greater Bulk than that of the $\frac{1}{3764060396563654679984851840619241}$th part of a cubical Inch, or that all the ſolid Matter of the Nerves, by which the Senſations in the human Syſtem are actually communicated to the Mind, cannot poſſibly weigh the $\frac{1}{14877708919520606993173874072000}$th part of a Grain.

That the ſtupendous Expanſion and Action of the Fibres and Veſſels of an Animalcule up to that of a full grown Man ſhould be owing to an Entity like this, a mere fluxionary Increment with reſpect to Quantity and Magnitude, will, I doubt not, to many appear impoſſible, to all incomprehenſible ; but are not all other of the Creator's Works equally ſo ? Or is this more than infinite Power acting on Matter infinitely diviſible is capable of, whoſe Particles muſt be ſtill higher ſubtiliſed, and ſpun into Fibres inconceivably more minute in the Bodies of Inſects, than is here ſpecified of the human, as they are all furniſhed with Arteries, Veins, Nerves, Muſcles, Bones, and Tendons ſuitable to their various Structures, and Manner of ſubſiſting.

The incomparable Mr. *Locke*, ſpeaking of the Identity of the ſame Perſon, reſolves it wholly into its Conſciouſneſs, even though the whole Subſtance, material or immaterial, ſhould be intirely changed. Many Phyſicians have alſo been of opinion, and ſome even laid it down as a Maxim, that the whole Subſtance of the Body, during the Length of an ordinary Life, is ſeveral times ſo intirely changed, as to conſiſt wholly of new Particles, of the ſame Nature and Kind as the preceeding. How far theſe Opinions may agree with what is taught by Divine Revelation, where this very Sameneſs, in its ſtricteſt Acceptation, ſeems to be expreſsly declared, is not my province to determine. But this we may plainly deduce from what has been premiſed, that the whole Subſtance of the Body, except theſe original Stamina of the Animalcule, may be many times changed, and yet the real Body continue the ſame, and be poſſeſſed of the ſame perſonal Identity, with regard both to Body and Mind, at the End of the longeſt Life, as it was at the inſtant of its Birth; nay even in the Animalcule itſelf.

That theſe original Stamina ſhould all remain unhurt, and fit to perform their ſeveral Functions to the End of Life, is a Poſition not to be admitted; but that without a competent Number of them ſo remaining, the Animal will decline both in its vital and intellectual Faculties, notwithſtanding the Body be repleniſhed with a ſufficient Number of homogeneous Particles to ſupply the Place of ſuch Parts as are abraded and worn away, or otherwiſe hindered from performing their natural Functions, ſeems equally certain; both from the Decay of our intellectual Faculties, and the gradual Loſs of Vigour in the Body, even whilſt the Force of the vital Organs ſeems no ways impaired. Conſequently ſomething more muſt be neceſſary, than the mere Application of homogeneous Matter to ſupply this Demand. But that can be no other, than that particular Texture, with which they were originally formed, and by which they become capable of tranſmitting the Effects of external Agents to the Mind.

It may poſſibly be objected, that all Matter being equally incapable of Senſation, no Reaſon can poſſibly be aſſigned, why ſuch homogeneous Matter, as ſupplies the conſtant Loſs, the Body ſuſtains by the Attrition of its Parts on each other, and ſerves for its Accretion, Strength, and Nutrition, may not be equally capable of conveying our Senſations to the Mind, as the original Stamina above mentioned. But if we may reaſon from what enſues in the larger Parts, which are compounded of theſe very Stamina, upon their being wounded, or broken with Loſs of Subſtance, 'tis evident, that though by the Addition of homogeneous Matter to the different Species of Veſſels, the Body to Appearance, may have received no great Detriment, and be ſufficient for the principal Purpoſes of Life; yet are ſuch Parts of very dull and obſcure Senſation, if they may be ſaid to enjoy it in any other manner, than by their Union with the original Stamina. So that could we ſuppoſe theſe Stamina quite deſtroyed, and the Body ſo far changed, as to conſiſt only of ſuch homogeneous Matter, though with Veſſels in Form and Bulk ſimilar to the former, yet theſe united by a Texture different from that of the original Fibres; 'tis evident from what enſues upon a like Change in the Fibres conſtituting the larger

Parts, that ſuch a Perſon, if he had either Senſitive or Intellectual Faculties at all, muſt have them in a manner vaſtly different from thoſe of the former. And conſequently this Sameneſs or Identity muſt remain in a great Meaſure fixed and unalterable in the Body from its Birth to its Diſſolution.

Nor is this Difference in the original Stamina confined in its Effects to the fibrous Parts of the Body only, but communicates them to the circulating Juices themſelves, diſtinguiſhing thereby the different Kinds of Fleſh of each Species of Animals from each other, even where they are ſuſtained by the ſame Kind of Food. Otherwiſe it would happen in Caſes of this Kind, that the Taſte, Complexion, Odour, and Coheſion of the Fleſh would of Neceſſity be nearly the ſame in all.

The ſame would be the Conſequence with regard to the Glands of the ſame Body, which would ſeparate nearly the ſame Kind of Juice, and conſequently be uſeleſs, or perhaps prejudicial, was it not prevented by the different Structure both of the Strainer itſelf, and the Preparatory Veſſels. For howſoever we may imagine the Juice to be ſeparated from the circulating Maſs, we cannot with any Colour of Reaſon ſuppoſe ſuch a various and exquiſite Contrivance, as is diſcovered not only in the Formation of the Gland itſelf, but alſo in that of the Veſſels leading to and from it, ſo widely differing among themſelves in their Structure, Texture, and Capacity (*a*), ſhould ever be deſigned only to perform what any one Species of them was capable of.

Hence then it muſt follow, that the principal Differences in Animal Bodies are owing to the different Structure of the original Stamina, with regard not only to their exterior Shape and Actions, but that even the Fluids themſelves, and that ſolid Part called the Fleſh, derive their chief and principal Difference from this Source; and conſequently, that there is a real Identity of Animal

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(*a*) Sect. 6. Exp. 47. of the Experimental Inquiry on, &c.

Bodies incommunicable to any other, depending on this very Cauſe.

Nor is this relating to the Fluids a mere Conjecture, but a real Fact, as appears from thoſe morbid Caſes, where either the Glands, Preparatory Veſſels, or even the fleſhy Parts are vitiated and depraved; which never fail to ſeparate unnatural Juices, tho' derived from the moſt healthful Blood.

Analogous to this we ſee in the Vegetable World, that it is not the Root, or even Trunk of the Tree, tho' all the Juices are thereby ſupplied, but the Bud or Scion only, which governs the whole, and produces the Species of Bloſſoms and

Fruit peculiar to itſelf. In like manner the Veſſels of the Animalcule, of what Species ſoever it be, convert the Juices deſigned for its Nouriſhment, each, into ſuch as are ſuitable to their different Structures; and thence keep up an infinite Variety in Animals, tho' ſupplied by the ſame kind of Food, according to the different Veſſels by whoſe means it is elaborated and perfected, being in ſome highly volatiliſed and attenuated, which gives the high Taſte; in others more viſcous and inactive, which produces the oppoſite, and are therefore leſs pleaſing to a voluptuous Appetite.

I am not here ſuppoſing, that the Qualities of the circulating Juices of

Animals depend ſo intirely upon the Structure of the Solids, that the Diverſity of Food is herein of no Conſequence, daily Experience ſufficiently confuting ſo abſurd an Opinion. But only that in thoſe of a different Species, the Taſte, Odour, and other Qualities of their Juices, are principally owing to this different Structure; as is manifeſt from hence, *viz.* that the Qualities of the Juices of differing Animals, though ſuſtained with the ſame Kind of Food, are more diſſonant to each other, than are thoſe of the ſame Species, though ſuſtained with Food of a very different Nature; and conſequently, this Identity in the various Species of Animals, muſt principally conſiſt in the Structure of the Solids, or, in other Words, in the original Stamina of each individual Species.

Thus has our Reaſoning at length led us to the Diſcovery and Demonſtration of a Truth, which at firſt Sight muſt appear beyond all Probability, and we can now with Certainty affirm, that from ſo ſimple a Cauſe as the different Modification of the ſame Matter, the wiſe Author of Nature has produced not only one kind of Fleſh of Men, another of Beaſts, another of Fiſhes, and another of Birds; but theſe alſo infinitely different in the different Species of each.

Hence we may ſee, why ſome Animals ſhall neceſſarily require ſuch a

Degree of Warmth, to preſerve their Juices ſufficiently exalted and attenuated for their comfortable Subſiſtence, as others cannot ſuſtain without Prejudice, even ſcarcely without a Diſſolution; and *vice verſa*, why ſuch a Degree of Cold, as is only agreeable, or perhaps neceſſary to the Health of theſe, ſhould prove ſo far deſtructive of others, as on the leaſt Condenſation of the Fluids from that Cauſe, to render them torpid, motionleſs, and ſeemingly dead, till reſtored by the kindly Influence of the approaching Summer.

Hence alſo it is obvious, why the Blood and Juices of ſome particular Species of Animals ſhall be affected with Diſeaſes of a Peſtilential Nature with regard to them, from ſuch Cauſes, as ſhall produce very few Inconveniences to many other Kinds.

Hence alſo we may ſee the Reaſon, why each individual Perſon has ſome Particularities in his Conſtitution peculiar to himſelf, not to be found in the Generality of the Species, nor depending on his Manner of Life, by which he is as it were diſtinguiſhed from the reſt: Which alſo probably may ſometimes be the Caſe in Brutes, tho' more rarely than in Men, could we equally arrive at the Knowledge of it, as is manifeſt from the different Sprightlineſs, Vigour, and Activity of ſome compared with others of the ſame Species.

Laſtly, hence we may ſee, why an intire Change of the Conſtitution ſhould be attended with almoſt inſuperable Difficulties: Why great Alterations require a long and gradual Proceſs, nor are to be attempted by haſty Methods, leſt the Patient, inſtead of Relief, meet with certain Ruin and Deſtruction.

FINIS.

MVSEVM BRITAN